Geomatics and Traditional Knowledge – Liidlii Ku'e First Nation[1]

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1. SUMMARY

Northern Canada is mainly populated by aboriginal people. They have depended for thousand of years on their knowledge of the land and a special relationship with their environment to survive and thrive as a people. Aggressive development of natural resources has brought many research projects to the North and the proponents have been interested in tapping into aboriginal Traditional Knowledge. This Traditional Knowledge has been passed on from one generation to the next and is based on thousands of years of observation and validation. Living on and of the land for millennia has provided for an accumulated knowledge and understanding of the human place in relation to the universe.

From the development of Canada's first diamond mine to the proposed Mackenzie Gas Pipeline, industry has expanded its understanding of northern aboriginal people and has been involved in Traditional Knowledge gathering as part of the environmental and regulatory processes in Northern Canada.

Many First Nations are concerned about preserving their Traditional Knowledge and the place it may have along modern western science. Liidlii Ku'e First Nation of Fort Simpson, Northwest Territories, has taken the step of developing a Traditional Knowledge policy aimed at protection, conservation and sharing its Traditional Knowledge. In doing so it has discovered the very important role that GIS can play in support of Traditional Knowledge data gathering and update, as well as in the decision making process.

2. BACKGROUND

For thousands of years northern aboriginal peoples have depended on their knowledge of the land, their special relationship with the environment, their ways of organizing themselves and their values not only to survive but also thrive as a people. Traditional knowledge was passed on from one generation to the next and was based on thousands of years of observation and validation. In the relatively short history of the Northwest Territories, the institutions, laws, programs, activities and policies of both government and non-government institutions have been largely based on assumptions, values and knowledge of Canadians from European descent. Today Northern aboriginal peoples are demanding that culturally appropriate systems be put in place to provide for the integration of their traditional knowledge into the institutions which serve them. Rapid social change and the death of more aboriginal elders each year add to the urgency of documenting and increasing the use of traditional knowledge.

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The value of traditional knowledge is progressively more recognized outside aboriginal communities in the Northwest Territories, and internationally, as having modern relevance and application, particularly with respect to responsible management of the environment and its resources. Canada's legislation has established traditional knowledge benchmarks for the environmental process that projects must adhere to in order to receive the permits required to proceed.

Canada's northern political landscape has changed tremendously in the last two decades. Many longstanding aboriginal land claims have been settled starting with the Inuvialuit Final Agreement in 1984; followed by the Gwich'in (Dene/Metis) Comprehensive Land Claim Agreement in 1992; the Nunavut Land Claim Agreement and the Sahtu Dene and Metis Comprehensive Land Claim Agreement both in 1993; and finally the Tlicho Agreement of 2003. With each agreement signed by the federal and territorial governments and the various aboriginal groups, co-management regimes came into being covering lands, resources and environmental matters. These have been instrumental in a greater participation from aboriginal people and northern residents in the shaping of regulatory requirements for all natural resources project in the Northwest Territories. However the southern portion of the Northwest Territories like the Deh Cho region and the South Slave region are currently in negotiations with the federal and territorial governments to settle their long-standing comprehensive claims. Co-management regimes such as those found in the Inuvialuit, Gwich'in and Sahtu regions do not exist in the Deh Cho region whose people must rely of laws of more general application to take care of issues related to lands, natural resources and the environment.

To address some of the environmental issues the Canadian federal government in the late 1990's implemented the *Mackenzie Valley Resource Management Act* with the intention of providing northerners in the Northwest Territories decision-making participation and responsibility in environmental and natural-resource matters. The legislation establishes co-management boards for the Sahtu and Gwich'in land claim settlement areas with responsibilities for land use planning and for issuance of land use permits and water use licences. The Inuvialuit region has its own process as per their comprehensive land claim agreement reached in 1984. In the rest of the Mackenzie Valley, an umbrella board, the Mackenzie Valley Land and Water Board, was established in April 2000. This body issues land use permits and water licences in those areas of the Mackenzie Valley where aboriginal comprehensive land claims have not been settled. It also establishes a Valley-wide public board to undertake environmental assessments and panel reviews. This is the Mackenzie Valley Environmental Impact Review Board. The *Canadian Environmental Assessment Act* no longer applies in the Mackenzie Valley except under very specific situations.

The *Mackenzie Valley Resource Management Act* introduces a new system of environmental impact assessment. There are three levels in this process - preliminary screening, environmental impact assessment and environmental impact review. Not all developments go through all three levels. Most stay at the regulatory stage and licenses are issued after a preliminary screening. A local government, such as a local First Nation affected by a project, can play a role in each step by presenting its views on applications for development and referring a project to the next requirement.

In northern Canada it is fairly accurate to say that the majority of major projects go to the formal environmental impact review stage as they are generally large in scope (Ekati Diamond Mines and Diavik Diamond Mines in the Eastern Northwest Territories, and the proposed Mackenzie Valley Pipeline from Inuvik into Alberta for example) and affect many communities and groups of people. This stage is a more detailed and comprehensive analysis, which is normally reserved for development projects where the environmental impact is greater. Public consultations and hearings are a required part of this process. The EIRB would actively solicit comments from affected parties through written submissions or through public consultations. Local governments would be invited to respond to any application for development and to submit their views on environmental or socio-economic impacts. The Board would take all responses into consideration when making its decision. The recommendations contained in the report would form part of the requirements to any land use permit or water use licence. The Review Board has to take into consideration as well the protection of the social, cultural and economic well being of residents and communities in the Mackenzie Valley. The Review Board then submits its report to the federal Minister of Indian Affairs and Northern Development.

This legislation in particular, and its various regulations and requirements, recognizes the value of traditional knowledge on the same footing as western modern science. It is therefore required that project proponents gather not only modern scientific data but also traditional knowledge in the areas affected by the project.

Living on and of the land for millennia has provided for an accumulated knowledge and understanding of the human place in relation to the universe. This traditional knowledge encompasses spiritual relationships, relationships with the natural environment and the use of natural resources, relationships between people, and is reflected in language, social organization, values, institutions and laws of a particular First Nation. It can be described as the ancient, communal, holistic and spiritual knowledge that encompasses every aspect of human existence, which has been passed from generation to generation orally and through personal experience and spiritual teachings, and pertains to the identity, culture and heritage of a First Nation. As a result of planned or proposed natural resources development affecting First Nations' traditional territory, more and more requests for traditional knowledge information is filtering through the regulatory bodies to the First Nations throughout the Mackenzie Valley.

3. LIIDLII KU'E FIRST NATION'S OBJECTIVES

Liidlii Ku'e First Nation is a Dene First Nation whose traditional territory encompasses a large area around Fort Simpson in the Northwest Territories in Canada covering over 100,000 km². Liidlii Ku'e First Nation is a member of the Deh Cho First Nations, an alliance of 14 Dene communities in the south western corner of the Northwest Territories and is the largest aboriginal community in the Deh Cho with over 1,200 members.

Because of the heightened interest in natural resources development in northern Canada, Liidlii Ku'e First Nation (www.cancom.net/~lkfdir/) currently finds itself in the position of having to respond to numerous requests for Traditional Knowledge information. Furthermore as a result of the Mackenzie Gas Project currently underway in the Mackenzie Valley, these

requests have intensified and not only impact their own traditional territory but also overlap with neighbouring communities and First Nations. The Mackenzie Valley Pipeline Project will go through the Inuvialuit, Gwich'in, Sahtu, and Deh Cho regions of the Northwest Territories.

The current extreme interest in the development of a Mackenzie Valley natural gas pipeline to bring northern gas found in the Mackenzie Delta to southern markets in Canada and the United States is driving many First Nations to examine their policies with respect to Traditional Knowledge data and information. With the Mackenzie Gas Project moving through its project definition phase and the interest expressed by many companies in development within Liidlii Ku'e First Nation traditional territory, Liidlii Ku'e First Nation believes that a comprehensive Traditional Knowledge policy that reflects its principles and values is absolutely critical to its ability to answer the various requests for Traditional Knowledge information in a responsible manner. Therefore a Traditional Knowledge policy and procedures development project was initiated by Liidlii Ku'e First Nation. The policy and procedures developed were integrated within Liidlii Ku'e First Nation lands department and automated to a large extent within an operational GIS containing all Traditional Knowledge data.

The objectives were to develop a policy on Traditional Knowledge; the development of procedures to support the policy; the identification of staffing and training requirements to handle the new policy and procedures; and the identification of any equipment upgrades that may be required as a result of the implementation of the new policy and procedures.

The development of a Traditional Knowledge policy by Liidlii Ku'e First Nation is a function of Chief and Council. As such policy needed to be put in place rapidly, it was deemed expedient to adopt a Traditional Knowledge ***Interim*** Policy. The use of an ***interim*** *policy* provides more time for consultation of the membership to ensure that the final policy reflects the beliefs and values of the membership. Also there were a number of events that made the adoption of an interim policy the best solution: a new Chief and Council were elected in early June 2003; the land administrator/coordinator position had been vacant for some months; and the Elders committee has been inactive as a result of the above position being vacant. An interim policy makes sense and provides the proactive approach that Liidlii Ku'e First Nation is known for while at the same time giving ample time for the consultation of elders, harvesters and members in general on the policy.

Also examined were the integration of aboriginal policy with GIS technology and the implementation of such GIS to serve a First Nation's needs while providing answers to industry with relevant, accurate and confidential information related to Traditional Knowledge requirements. The relationship between traditional knowledge and modern technology, coupled with aboriginal versus Canadian-European values, is a major concern. A Traditional Knowledge policy and GIS attempt to integrate these differing views and opinions.

4. POLICY DEVELOPMENT

The policy development focused on 3 main tasks:

- Review available data from other northern aboriginal groups
- Interview GIS specialist, Liidlii Ku'e First Nation GIS trainee, and Liidlii Ku'e First Nation land administrator
- Discussions with Liidlii Ku'e First Nation Chief and Liidlii Ku'e First Nation Executive Director as well as consultation with the Aurora Research Institute, a body responsible for granting research licenses within the Northwest Territories.

These tasks were followed by the examination of GIS and Traditional Knowledge and the policy development required to answer all the questions related to Traditional Knowledge.

4.1 Review of available data

Most of the research took place through the Internet and through requests for information to the following northern aboriginal groups to gather information on existing Traditional Knowledge policies and GIS: Inuvialuit Land Administration, Tuktoyaktuk, NWT; Gwich'in Research Institute; Sahtu Secretariat and the Sahtu GIS; Deh Cho First Nations; and the Tli Cho (Dogrib) First Nation.

The way Traditional Knowledge is handled varies greatly and the process is generally clearer where aboriginal comprehensive land claims agreements are in place. In the regions which have a settled comprehensive claim such as Inuvialuit, Gwich'in, Sahtu and most recently Tli Cho, the Agreements provide for certainty and for aboriginal control and/or co-management over lands and resources. This in turn provides each aboriginal group with a well-defined framework where a Traditional Knowledge policy can be developed. In the Deh Cho region, the Deh Cho First Nations (www.dehchofirstnations.com) have developed a "Deh Cho Process" that guides them in their negotiations with the federal and territorial governments towards a final agreement. In the meantime, lands and resources generally are under the jurisdiction of either federal or territorial government depending on their location and the legislation governing them. The Deh Cho First Nations have recently signed a Deh Cho First Nations Interim Measures Resources Agreement in May 2001 with both levels of governments to provide more certainly for industry while the Deh Cho process runs its course.

The Inuvialuit do not per se have a Traditional Knowledge policy but have very well defined land and resources policies and procedures as can be seen on their website, www.irc.inuvialuit.com/corporate.default.asp. The Gwich'in have a draft traditional Knowledge policy which is a work in progress and also have well defined land and resources policies and procedures as can be seen on their website www.gwichin.nt.ca/LandAdminContactsAndBackground.htm. The Sahtu on the other hand use the Sahtu Land and Water Board (www.slwb.com) and the Sahtu Land Use Plan (www.sahtulanduseplan.com) as well as district based land and resources administration.

Tli Cho for its part has just voted in favour of the signing of its final agreement, which provides for aboriginal self-government of the Tlicho settlement area. It can be assumed that Tlicho will be developing strong policies and procedures with respect to its lands and resources. It has already developed leading edge Impact Benefit Agreements with BHP Billiton Ltd., owner of Ekati Diamond Mine situated on Tlicho traditional territory and with Diavik Diamonds Project, a joint venture between Diavik Diamond Mines Inc. owned by Rio Tinto PLC, and Aber Diamond Mines Ltd. owned by Aber Diamond Corporation. These agreements recognize the value of the traditional territory and contain significant environmental damage mitigation measures.

Within the Deh Cho several First Nations are in the process of developing Traditional Knowledge policies because of the activity created by the Mackenzie Gas Project. One of the initial steps of the environmental process is to gather Traditional Knowledge data as required by the various legislation applicable to the project. Liidlii Ku'e First Nation has taken the step of developing its own Traditional Knowledge policy and procedures as it undertakes a Traditional Knowledge Study in its traditional territory in cooperation with the Mackenzie Project Environment Group and the Mackenzie Delta Gas Producers (Imperial Oil Resources, CONOCO Canada Resources Limited, Shell Canada Limited, and ExxonMobil Canada) represented by Imperial Oil Resources.

Of significant concern throughout the research was the protection of copyrights related to the traditional knowledge and the confidentiality of such data. The policies contain clear copyright protection statements and assert that any traditional knowledge data gathered by any researcher belongs to the First Nation and set out clear limitations and conditions on the sharing of traditional knowledge information and data.

4.2 Interviews with GIS specialist, Liidlii Ku'e First Nation GIS trainee, Liidlii Ku'e First Nation land administrator

The interviews with a GIS specialist, GIS trainee, and land administration staff was meant to provide the technical understanding on implementation and "going forward" challenges faced by Liidlii Ku'e First Nation.

Liidlii Ku'e First Nation has in its possession a large amount of digital data related to traditional knowledge, some of which gathered by Deh Cho First Nation an umbrella group mandated to negotiate a comprehensive agreement under the Deh Cho process with the federal and territorial governments. However the hardware and software used for manipulating and viewing the data were outdated and nobody in the employ of Liidlii Ku'e First Nation could actually use it. This meant that the data was not maintained nor updated and that the whole system sat unused.

The interview with a GIS specialist made it clear that in order for Liidlii Ku'e First Nation to benefit from its traditional knowledge, there would a need for an employee trained in the use of computer and GIS software and hardware. It also was pointed out that the use of a GIS for all traditional Knowledge data and information, because it is all land related, would provide significant benefits to Liidlii Ku'e First Nation and all its members.

Through the current Traditional Knowledge Study underway, Liidlii Ku'e First Nation was able to hire a GIS trainee and update the computer hardware and software required for an effective GIS. The trainee, who is from Fort Simpson and Liidlii Ku'e First Nation member, is currently undergoing formal training in ArcGIS from ESRI (www.esri.com) Canada as well as completing various free web-based training sessions. The trainee will also be receiving direct on the job training from a GIS specialist in data manipulation, storing, thematic map production, data maintenance and update procedures, and back-up procedures. The trainee is becoming familiar with the existing data and the Traditional Knowledge Study project that will provide new and updated data to integrate with the existing data. The GIS trainee is very enthusiastic about GIS and computers in general, and is very interested in a traditional knowledge project.

The land administrator/coordinator position is currently vacant but expected to be filled in the very near future with someone having formal education in land and/or resources management and exposure to GIS. It has become clear that an understanding of GIS would be crucial to the land administrator/coordinator assisting Liidlii Ku'e First Nation in effectively manage its lands and resources. It will be expected that this person will be able to request data and information from the GIS trainee and provide assistance to Chief and Council in decision making through the use of GIS data.

The review of GIS data and implementation, as well as handling of industry requests, finalizes the information gathering stages of the project.

4.3 Discussions with Liidlii Ku'e First Nation Chief and Liidlii Ku'e First Nation Executive Director as well as consultation with the Aurora Research Institute, a body responsible for granting research licenses within the Northwest Territories

Throughout the project, there were many conversations and discussions with Ms. Keyna Norwegian (Chief) and Ms. Rosemary Gill (Executive Director), which served an important purpose in maintaining high-level local involvement and providing ongoing direction for the project.

Ms. Rosemary Gill has been the driving force behind the development of a Traditional Knowledge policy. Liidlii Ku'e First Nation had just completed a sweeping reform of its policies and it was a normal progression to embark on the Traditional Knowledge policy. Ms. Gill is a member of Liidlii Ku'e first Nation and has personal knowledge of the land through her own experience as well as through the eyes of family members. Her insights on what to consider, who to talk to, and her general knowledge was crucial to the project.

Many discussions were held with Liidlii Ku'e First Nation Chief-elect (June 2003) Ms. Keyna Norwegian to obtain a clear understanding of the main areas of concern related to Traditional Knowledge. Ms. Norwegian is well aware of the members' concerns and has a personal relationship to the land as well as many of Liidlii Ku'e First Nations members. In those discussions, the main elements of a Traditional Knowledge policy emerged clearly and were focused on ownership and control, copyrights issues, and confidentiality. Through these discussions the Traditional Knowledge policy received its basic framework.

Of main concern to Liidlii Ku'e First Nation is ownership of its Traditional Knowledge and control of any data dissemination through copyright protection. It has been made clear that these elements must be taken care of through any policy and procedures directed towards Traditional Knowledge. Such elements must also be clearly identified, defined and explained so that outside parties know and are aware of the requirements and limitations imposed on Liidlii Ku'e First Nation Traditional Knowledge. An overview of the Canadian copyright law was undertaken to ensure that the policy would clearly deal with any legal requirements for copyright protection, and that the policy and procedures would adequately protect Liidlii Ku'e First Nation Traditional Knowledge.

The Manager, Scientific Services at the Aurora Research Institute (www.nwtresearch.com), Ms. Sandra Kalhok reviewed the policy in its first draft format and provided numerous comments based on experience with the various existing policies in northern Canada. These comments were incorporated in the final interim policy. Specifically the main concern was related to the necessity of making room for small scale, low budget research projects led by graduate student, university or not-for-profit organizations. The first draft of the policy concentrated heavily on industry led research projects and there was a real concern of making it prohibitive for anyone but a large corporation or a government department to carry out these projects.

5. GIS (GEOGRAPHICAL INFORMATION SYSTEM)

5.1 GIS and Traditional Knowledge

GIS technology and tools are relatively new and certainly very new as applied to Traditional Knowledge. In the past few years, GIS has become the norm for many industries especially in the land use and environmental areas. GIS as the name implies – Geographical Information System – is able to deal with extremely large data sets in seconds and provide sophisticate information related to the geographical data. GIS then appears to be well suited to deal with Traditional Knowledge as this knowledge is land based and therefore geographical in nature.

The GIS acquisition was a simple matter with two main requirements: it had to be able to handle an extremely large amount of data and had to be compatible with most systems in use by industry. These requirements meant that ArcGIS was the chosen software as it was established that it is the software of choice in the resources industry in Western and Northern Canada. The hardware components are of such nature and capabilities that it can deal with GIS requirements. A new system was acquired and installed in Liidlii Ku'e First Nation's office in Fort Simpson in July 2003.

A real challenge arises because of the fact that Traditional Knowledge is mainly oral and its integration into a GIS carries a whole new set of difficulties that is not normally encountered when dealing with geographical data. With oral Traditional Knowledge, the first task is to make it geographical i.e. take the oral information and relate it to a map. The use of maps and stickers (available digitally and in hard copy formats) in the shape of animals, vegetation, fish, tree species, etc. during formal interviews with Elders and harvesters for data gathering alleviated this difficulty and provided for the transfer of oral knowledge to a geographically based knowledge which can then be incorporated in a GIS. The maps will be used together

with the stickers to identify where the wildlife, vegetation, specific sites, etc. are found, making a picture of the oral knowledge. The stories linked to these will be taped and tied to the geographic location through the GIS.

Another continuing challenge is in finding and retaining qualified and interested local people. Generally formal qualifications are low and certainly not up to industry standards. Therefore a meaningful training program must be developed and implemented at every step of the way. Incentives such as a progressive salary scale, conference attendance, formal and informal training are just a few examples of what is required from any employer. Retention is the larger issue. It is well known by northern businesses that as soon as someone becomes competent and well trained, this person is hired away by someone else and the whole cycle has to be started again.

Liidlii Ku'e First Nation has been in the same situation as any employer and it has been difficult to retain qualified people. As an example, there was a GIS trainee employed by the First Nation previously. However there was an opportunity for the trainee to get industry experience with a major player in southern Canada while still employed by the First Nation. This capacity building opportunity was excellent and viewed as providing the trainee with formal and on the job training using state of the art technology and tools. The opportunity will last at least one year and may be renewed for another year. While it is hoped that this trainee will return to work for the First Nation in Fort Simpson, it created some difficulties in the short term for the First Nation. Another GIS trainee had to found and trained in order to carry on with the projects undertaken by Liidlii Ku'e First Nation.

5.2 GIS data and procedures

The review of GIS data and implementation, as well as handling of industry requests, finalizes the information gathering stages of the project. Straightforward data handling respecting industry standards are being implemented as well as layers and data storage protocol. GIS data and procedures have been the easiest thing to do: industry standards are well established and easy to meet. This is a technical requirement that is not difficult to manage as long as the procedures are well defined and followed.

The GIS trainee spent many weeks undergoing formal and informal training looking forward to the execution of a real project. A project finally became a reality in June 2003 and involves a Traditional Knowledge Study for the Mackenzie Gas Project. The role of the GIS trainee will be to review the existing GIS data stored on Liidlii Ku'e First Nation's old system and prepare a full inventory of all available data. The project also provides new digital maps and aerial photos, which also require inventory. Once the data has been fully inventoried, the various protocols for data storage and layering schemes will be definitely established enabling the GIS trainee to prepare the relevant maps for the data gathering phase and carry on updates as required. In the future the GIS will allow the First Nation to quickly prepare thematic maps showing the required data will assist in the decision making process and answer requests from industry.

The lands department is expected to benefit greatly from GIS as it will assist in streamlining its functions. The lands department reviews all permit applications currently in the regulatory

process from the Territorial and Federal governments. It also reviews land applications from other stakeholders for lands outside the municipal boundaries of Fort Simpson. It provides the preliminary screening for land applications, cross-reference the maps provided by a regulatory body with the traditional knowledge information available, investigates the applications and provides summary of the findings. The same process is followed for any resource related issues. The integration of all processes in the lands department through a GIS will guarantee the use of the most up to date data and hopefully preclude decisions based on incomplete information. It will provide for streamlined functions and eliminate duplication. The visual element provided by accurate and up to date maps will also be a tremendous asset to the decision making process as it is true that "A picture is worth a thousand words".

6. TRADITIONAL KNOWLEDGE POLICY AND PROCEDURES

A draft Traditional Knowledge policy has been developed taking into consideration all of the above and paying close attention to the specific concerns voiced by Liidlii Ku'e First Nation. This first draft was reviewed many times before the final draft was presented to Chief and Council for approval as its Traditional Knowledge Policy. This latest draft was also renamed to become an interim policy. It was felt that an interim policy is much more adaptable as it can be reviewed and altered periodically more easily. It also provides for members to become familiar with the interim policy and make comments and suggestions. Chief and Council first adopted the interim policy at its regular meeting on June 26, 2003.

Following the approval of the interim policy at this meeting, many comments and suggestions were received, sparking an immediate revision to the interim policy and therefore revisions to the accompanying procedures. It is anticipated that the current Liidlii Ku'e First Nation "Traditional Knowledge Interim Policy" and procedures will be adopted by Chief and Council in October 2003.

7. CONCLUSION

Liidlii Ku'e First Nation is now armed with the tools required for the protection of its Traditional Knowledge through its interim policy. Using GIS to facilitate the safeguarding of the knowledge itself, its retrieval and use to assist Liidlii Ku'e First Nation's decision makers, the First Nation has amalgamated traditional knowledge passed on orally from one generation to the next and based on thousand of years of observation and validation, with modern technology through a Geographic Information System. It is capable through the use of thematic maps of showing any portion of its territory with as much or as little information as it chooses. The GIS grants Liidlii Ku'e First Nation total control over its Traditional Knowledge and allows it to answer industry's request using the same technology as industry.

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